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II. Solution by G. B. M. ZERR, A. M., Principal of High School, Staunton, Virginia.

In solving this problem many things should be considered. We should know the temperature, the barometric pressure and the dew point in order to calculate the amount of aqueous vapor present in the air.

Not knowing the above it will be well to proceed as follows:

Let r=outside radius of bubble, x=inside radius.

ρ=density of air
ρ_1=density of hydrogen,
ρ_2=density of soap film,

all at the given temperature and pressure and all referred to normal air as standard.

$$\text{Then } \tfrac{4}{3}\pi(r^3-x^3)=\text{volume of soap film},$$

$$\tfrac{4}{3}\pi\times\frac{x^3}{16}=\text{volume of hydrogen},$$

$$\tfrac{4}{3}\pi\times\frac{15x^3}{16}=\text{volume of air}.$$

$$\therefore\quad \tfrac{4}{3}\pi(r^3-x^3)\rho_2+-\tfrac{4}{3}\pi\times\frac{x^3}{16}\rho_1+\tfrac{4}{3}\pi\times\frac{15x^3}{16}\rho=\tfrac{4}{3}\pi r^3\rho,$$

$$\therefore\quad 16r^3\rho_2-16x^3\rho_2+x^3\rho_1+15c^3\rho=16r^3\rho,$$

$$\therefore\quad x^3=\frac{16r^3(\rho_2-\rho)}{16\rho_2-15\rho-\rho_1},\quad\therefore\quad x=2r\sqrt[3]{\left(\frac{2(\rho_2-\rho)}{16\rho_2-15\rho-\rho_1}\right)}.$$

$$r-x=r-2r\sqrt[3]{\left(\frac{2(\rho_2-\rho)}{16\rho_2-15\rho-\rho_1}\right)}=\text{required thickness.}$$

Let the conditions be normal and suppose ρ_2, referred to water, is 1.1. Then since air, referred to water, is .001293, ρ_2, referred to air, is 850 73473, $\rho=1$, $\rho_1=.0693$, $r=1$.

Then $r-x=1\rightarrow2\sqrt[3]{(\frac{1199.46946}{13596.68638})}=.000023$.

Also solved by *P S. Berg*, *F. P. Matz*, and the *Proposer*.

14. Proposed by COOPER D. SCHMITT, A. M., Professor of Mathematics, University of Tennessee, Knoxville, Tennessee.

I have a glass paper-weight in the form of a regular icosahedron. I let the sun's rays fall upon it, at various angles, also upon one of the vertices. How many complete spectra will be formed? How many will be of white light? What position will give maximum number of spectra?

[No solution to this problem has as yet been furnished by our contributors, and I see no way of solving it. If a solution is possible it will be a very pretty one. —EDITOR.]

PROBLEMS.

22. Proposed by F. P. MATZ, M. Sc., Ph. D., Professor of Mathematics and Astronomy in New Windsor College, New Windsor, Maryland.

From what kind of dry wood must a ship's log be cut, in order that the log may float with its center of gravity at the water's surface?

PROBLEMS.

23. Proposed by G. B. M. ZERR, A. M., Principal High School, Staunton, Virginia.

Pliny says, "Thales determined the cosmical setting of the Pleiades to have happened in his time 25 days after the vernal equinox." Determine the time when Thales lived from the following data:—Latitude of Miletus 37° 30′, the precession of the equinox 50″.34 annually, the R. A. of Alcyon (η Tauris) Jan. 1, 1895, 3h. 41m. 15sec. declination 23° 46′ 49″ N.

24. Proposed by D. H. DAVISON, Minonk, Illinois.

For the purpose of locating the most eligible point for a county seat, it is required to determine the center of a county whose dimensions are as follows: Beginning at the S. W. corner. Thence east 15 miles, thence N. 33¾ miles, thence W. 6 miles to north end of a meridian line running south through the county; thence southwesterly to a point being 6 miles west from the meridian line and 9¾ miles south of its north end. Thence S. 3 miles, thence W. 3 miles, thence S. 21 miles to place of beginning.

[NOTE.—A solution to problem 12 will appear in March number. EDITOR.]

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QUERIES AND INFORMATION.

Conducted by J. M. COLAW, Monterey, Va. All contributions to this department should be sent to him.

DR. HALSTED'S LATEST TRANSLATION.

By LEONARD E. DICKSON, M. A., Fellow in Mathematics, University of Chicago, Chicago, Illinois.

It is a matter worthy of remark that, already master of four modern and two dead languages and a translator from several of them of no little repute, Dr. Halsted has vigorously attacked the Russian language with its 36 strange hieroglyphics and now gives to the world an insight into the best scientific thought of Russia, in the shape of a translation of the address by Prof. Vasiliev, President of the Physico-Mathematical Society of Kasan, pronounced last year at the meeting of the Imperial University of Kasan in commemoration of their illustrious compatriot Lobachevsky.

From every one devoted to Mathematics or Philosophy, or indeed to the highest advance of human thought in any form, this address will call forth the deepest admiration for Lobachevsky, now recognized as one of the greatest